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Dacampia rubra sp. nov. (*Ascomycota, Dacampiaceae*), a lichenicolous fungus on vagrant *Aspicilia* species

Mehmet Gökhan Halici[1], Mehmet Candan[2] & Vicent Calatayud[3]

[1]*mghalici@erciyes.edu.tr*
Erciyes Universitesi, Fen Edebiyat Fakültesi, Biyoloji Bölümü
38039 Kayseri, TURKEY

[2]*mecandan@anadolu.edu.tr*
Anadolu Üniversitesi, Fen Fakültesi, Biyoloji Bölümü
Eskişehir, TURKEY

[3]*calatayud_viclor@gva.es*
Fundación CEAM, Charles R. Darwin 14
Parc Tecnològic, 46980 Paterna, SPAIN

Abstract—*Dacampia rubra* sp. nov. is described on vagrant *Aspicilia* species from eastern Turkey and the Russian Federation. It is most similar to *D. rhizocarpicola*, an imperfectly known species described from *Rhizocarpon obscuratum*, but it differs from that species in the ascomata arising singly and is unique in the genus in having an orange-red pigmented region of the exciple surrounding the ostiole. The new species is the first *Dacampia* species reported on *Aspicilia*. It is associated with *Phoma*-like conidiomata, as also happens in *D. muraliicola,* but it was unclear whether this was an anamorph or an independent fungus.

Key words—biodiversity, lichens, Anatolia

Introduction

Halıcı & Hawksworth (2008) recognized seven species of *Dacampia* (*Ascomycota, Dothideales, Dacampiaceae*) and provided a key and synopsis to these species, along with drawings of the ascospores. After this study, one species, *D. cladoniicola* was described by Halıcı et al. (2008). Although, the type species of the genus, *D. hookeri*, is an independent lichen (Henssen 1995), the other eight species are lichenicolous and are generally restricted in their host range (Halıcı & Hawksworth 2008). This paper is a further contribution to our knowledge of lichenicolous fungi on vagrant *Aspicilia* species, on which several new species have been recently described (Calatayud & Barreno 2003, Calatayud et al. 2004).

Material and methods

The type material of the new species is deposited in ANES. Specimens were examined with an Olympus BH-2 research microscope fitted with Nomarski differential interference contrast optics and a drawing tube. Photomicrographs were prepared on a Nikon Eclipse 80i. Sections were prepared by hand and examined in I (Merck Lugol's iodine and Metzler's iodine, with [K/I] and without [I] pre-treatment with 10% KOH), 10% KOH alone, and water. Ascospore measurements were made in water; the extreme values outside the main range are given in parentheses. The length/breadth (l/b) ratio of the ascospores is given in the same way.

The species

Dacampia rubra Halici, Candan & Calat., **sp. nov.** FIGURES 1–2

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Dacampia *species insignis ascosporis (2–)4–6 transseptatiis et (2–)3–5(–6) longiseptatis, (22–)26.5–38.5(–40) × (9.5–)11.5–15(–17) µm (n = 40), l/b = (1.9–)2.2–3.0(–3.3).*

TYPE COLLECTION: Turkey, Malatya, Darende, East of Darende, 38°34'N, 37°31'E, alt. 1200 m, on thallus of a vagrant *Aspicilia* sp. on soil, 09 August 2007, leg. M. Candan (ANES 11138 – **holotype**).

ETYMOLOGY: The epithet "*rubra*" refers to the distinctive colour of the tissues around the ostiole which is unique in the genus.

DESCRIPTION: Lichenicolous, on the thalli of a vagrant *Aspicilia* sp., causing bleaching, pathogenic. ASCOMATA perithecioid, arising singly, immersed with only the ostiole and surrounding zone externally visible, 220–300 µm diam, 3–5 per areole (on vagrant *Aspicilia* sp. collected from Turkey), black, subglobose to obpyriform. Ostiole papilliform, 20–40 µm diam. Exciple composed of 5–7 layers of angular pseudoparenchymatous cells, textura angularis, 20–25 µm thick, but thinner in the upper part, the individual cells in the lower and lateral parts somewhat radially compressed, greenish brown to brown, individual cells 8–10 × 5–6 µm in vertical section, smooth, walls *ca* 1 µm thick; tissue in the upper part of the ascomata 35–40 µm thick, hyphal and radially orientated towards the ostiole, not densely compressed, thick-walled, the cell walls 1.5–2 µm thick, reddish brown in water mounts, with an amorphous, not granular, orange-red pigment reacting K+ purple. HAMATHECIUM of cellular pseudoparaphyses, abundant, septate, branched and anastomosed, 2–2.5 µm wide; periphyses present in the ostiole, septate, not branched, ca. 2 µm in diameter; centrum Lugol's and Metzler's solution (after pre-treatment with 10% KOH) I–. ASCI elongate-clavate to subcylindrical, very shortly stalked, bitunicate in structure, with an apical peak when young, (2–)4-spored in mature asci, 66–117 × (11.5–)14–17 µm (n = 24). ASCOSPORES uniseriately arranged in the mature asci, ellipsoid, dark brown, rounded to somewhat broadly pointed at the apices,

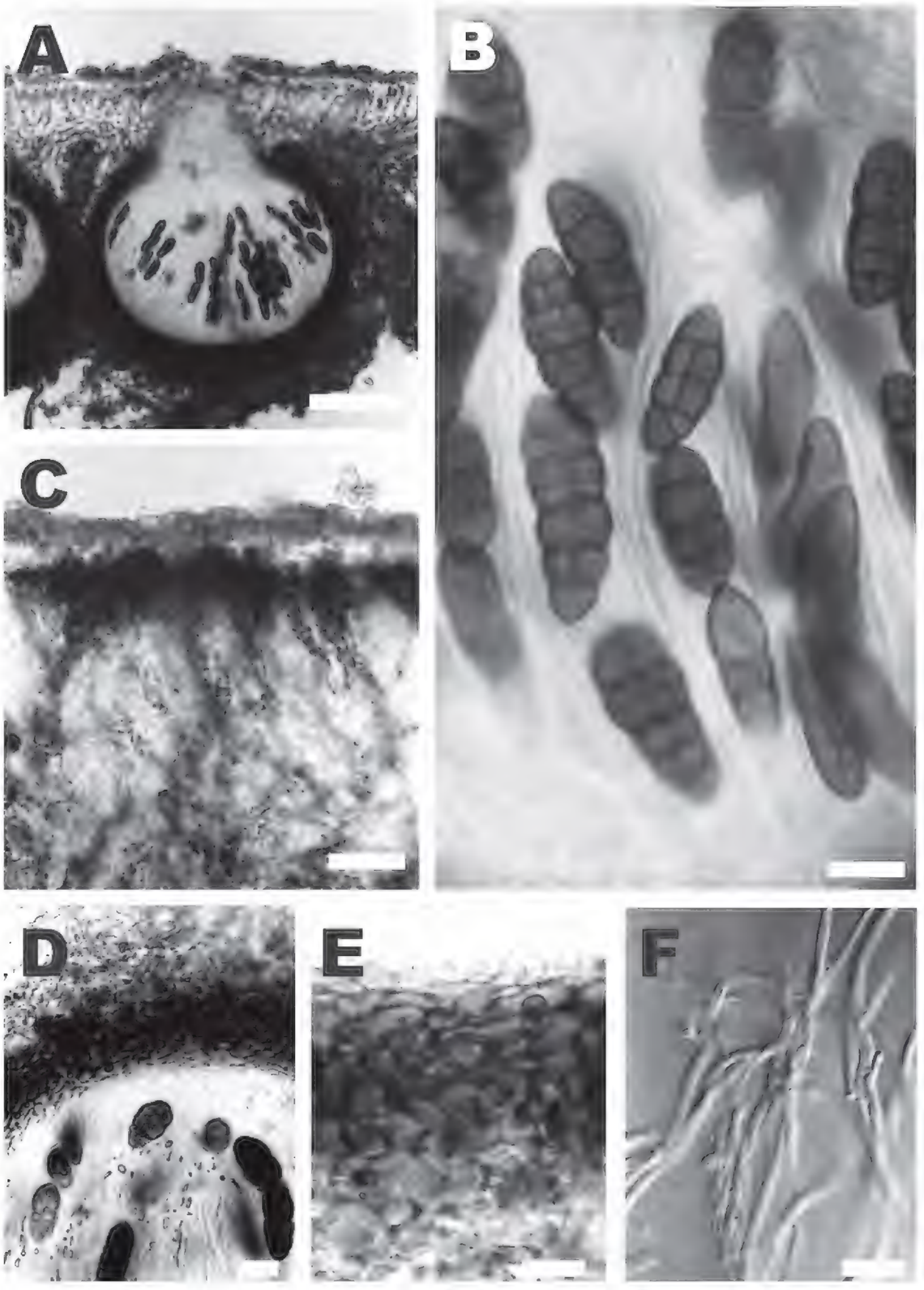

Fig. 1. ***Dacampia rubra*** (UPS 89/140, specimen 29).
A. Ascoma; B. Asci with ascospores; C. Vegetative hyphae (brownish);
D, E. Ascomatal wall; F. Interascal filaments.
Scales: A = 50 μm, B–F = 10 μm.

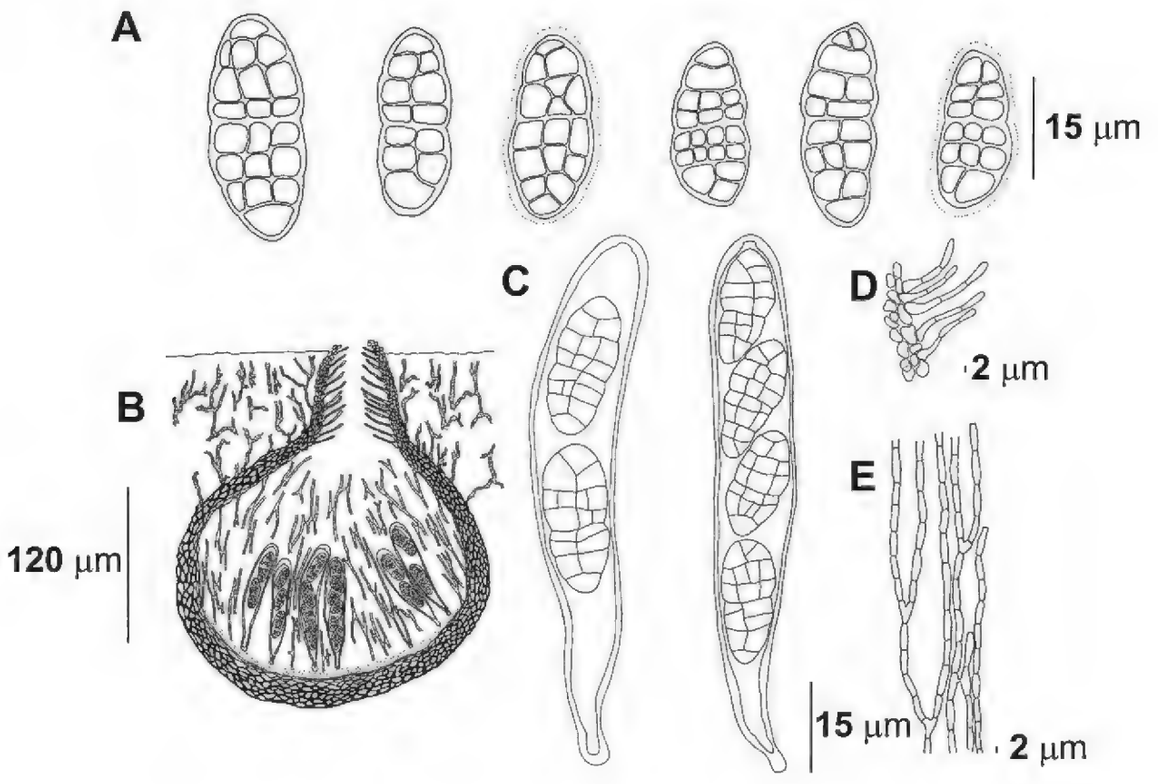

Fig. 2. ***Dacampia rubra*** (UPS 89/140, specimen 29).
A. Ascospores; B. Ascoma; C. Asci; D. Periphyses; E. Interascal filaments.

muriform, with (2–)4–6 transsepta and (2–)3–5(–6) longisepta, verruculose at 1500 × in higher magnifications, slightly constricted at the septa (especially in the medium septa), cells similarly coloured, with a gelatinous sheath, (22–)26.5–38.5(–40) × (9.5–)11.5–15(–17) µm (n = 40), l/b = (1.9–)2.2–3.0(–3.3), all measurements and ratio including the closely adhering sheath.

Vegetative hyphae sometimes present, arising upwards from the upper half of the ascomatal wall (towards the lichen thallus surface), more or less branched, septate, 2.5–3.5 µm in diam., brownish.

Ecology and distribution: The species appears to be pathogenic as bleaching is seen in the infected areoles of the host. The type material comes from one locality in eastern Turkey, from where several collections on an unidentified vagrant *Aspicilia* were studied. An additional specimen from the Russian Federation was examined by one of the authors (V.C.) on *Aspicilia fruticulosa*, from material distributed in a Savicz exiccatum. As the host lichens are restricted to continental areas with an Irano-turanian distribution, it should be searched in such localities.

Additional material examined: Russian Federation: URSS, Rossia europaea austro-orientalis, regio Astrachanensis, in viciniis lacus Baskunczak in decliviis montis Bogdo

[on *Aspicilia fruticulosa* f. *ferruginea*], anno 1926, V.P. Savicz [Exsicatum V.P. Savicz. Lichenotheca Rossica. Degas X (1960), UPS 89/140, specimen 29].

Observations: *Dacampia rubra* is unique among *Dacampia* species by having an amorphous, orange-red pigment deposited around the ostiole which reacts K+ purple. In addition to the net of interascal filaments, abundant periphyses can be observed lining the ostiolar channel. At present, the genus *Dacampia* includes species with and without periphyses (LIAS 1995–2009), which may be indicative of a certain heterogeneity. The relevancy of this character, however, should be evaluated in the framework of a wider study including *Dacampia* species and taxa of related genera, that should also consider molecular phylogenetic methods (Halıcı & Hawksworth 2008).

Dacampia rhizocarpicola, which was described from a scant material from UK growing in areoles of *Rhizocarpon obscuratum,* is the only other species in the genus with 2–4–spored asci (Halıcı & Hawksworth 2008). This species was described by Halıcı & Hawksworth (2008) with the intent of encouraging the search for more material which could enable a more detailed description to be prepared. *D. rubra* differs from *D. rhizocarpicola* in the ascomata arising singly and the orange red pigmented tissue around the ostiole, as well as the different hosts on different substrates. Also *D. rubra* has dark brown ascospores while *D. rhizocarpicola* has deep golden brown ascospores. *Dacampia hookeri*, has ascospores similar in size to *D. rubra*, but has constantly 8–spored asci, and it is a lichenized species (Henssen 1995).

Phoma-like pycnidial conidomata are intimately associated with the ascomata of *Dacampia rubra*. These are immersed, black, ostiolate, 50–100 (–120) µm diam, the pycnidial wall dark brown, pseudoparenchymatous, 7.5–9.5 µm thick, and composed of 3–5 layers of polyhedral cells. The conidiogenous cells line the inner wall of the pycnidial cavity, are subglobose, not proliferating, hyaline, smooth-walled, 5–7 × 4.5–6 µm, and the conidiogenesis enteroblastic. The conidia are abundantly produced, arising singly, ellipsoid, apically rounded, hyaline, simple, smooth-walled, without guttules, and 6.5–7.5(–9) × 4–4.5(–5.5) µm (n = 20), l/b = 1.6–1.9. Interestingly, not dissimilar pycnidia are also associated with the ascomata of *D. muraliicola* (M.G. Halıcı & D.L. Hawksworth, pers. comm.), but in that case these are 100–150 µm in diam., peridium is composed of 2–3 layers of cells, with conidiogenous cells, 4.5–6 × 3.5–4.5 µm, and smaller conidia, 4–5 × 2.5–3 µm (l/b ratio 1.6). At first we speculated whether these might be anamorphs of these two *Dacampia* species, but while there appeared to be hyphal connections we could not be confident whether these were parasitic or part of the same fungus. Single-spored ascospore cultures or molecular data are required to determine whether these *Phoma*-like pycnidia are part of the same fungi or not.

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